best thing we owe to the war. It was at a gathering of thinkers and social workers during the war that the idea of teaching world-history to all nations on a common plan was first mooted, and Mr. Wells responded to the appeal. His "Outline" has sold in hundreds of thousands, especially in the United States. It has provoked demands among working men to be taught history in that spirit; it has changed the outlook and the syllabuses of scores of teachers; it has helped to success other similar books such as the fascinating "Story of Mankind" by Van Loon, which has come over to us from America this autumn.

In view of all this, it is paltry and unworthy to dwell on minor defects or on differences of judgments, and still worse to condemn Mr. Wells because not being a "historian," he has done a work which "historians" ought to have done over and over again before.

It was probably this fact, that he was not a historian in that sense, immersed in the details of some special period or aspect of history, which, added to his own incomparable powers of reception, production, and imagination, enabled Mr. Wells to accomplish the feat. The freshness of his mind prompts him constantly to some interesting new view, some comparison especially of ancient and modern times, some wholesome challenge to accepted judgments; *e.g.* "It was not so much the Jews that made the Bible, as the Bible that made the Jews." "How important a century this sixth B.C. was in the history of humanity. For not only were these Greek philosophers beginning the research for clear ideas about the universe and man's place in it, and Isaiah carrying Jewish prophecy to its sublimest levels, but, as we shall tell later, Gautama Buddha was then teaching in India and Confucius and Lao Tse in China. From Athens to the Pacific the human mind was astir."

Even in the case of Rome, to which Mr. Wells still does less than justice, it is enlightening to have the comparison with our modern empire. "The Roman empire after all was a very primitive organisation; it did not educate, did not explain itself to its increasing multitudes of citizens, did not invite their co-operation in its decisions. There was no network of schools to ensure a common understanding, no distribution of news to sustain collective activity."

All such comparisons, whether of contemporary happenings or of earlier and later social states, are useful and inspiring and arise from the synoptic frame of mind which qualifies a man for such work as this. It is an antidote to the excessive criticism and tendency to pessimism which mark so much of our literature at the present time. But it needs to be based on a sound knowledge and appreciation of the historical fact, and it is naturally on this latter side that Mr. Wells is weaker. He does not estimate duly what Rome did for the world, the greatness of her legal work, its continued progress, its permanence in the modern world. Nor does he allow for the constructive value of the medieval Church and Catholic doctrine. No word of Dante (or of Descartes) with a whole chapter for Charles V.! That is a blemish impossible to pass over. It goes with a general tendency in the book to lay stress rather on the externals and the picturesque figures in history than on the deeper, spiritual, or intellectual factors. Thus Archimedes and Hero appear but not Pythagoras, Stephenson and Watt but not Descartes and Leibniz, or even Newton. Science appears as the transformer of industry, the generator of steam-engines and steamships, but not as the knitter-up of men's minds, the new universal doctrine which replaces theological dogma. Even science as the healer and preventer of disease seems to find no place: there is no word of Hippocrates or Pasteur.

We know well how easy it is in reviewing such a book to draw up lists of inexcusable omissions. It would be ungrateful in this case, for Mr. Wells has given us so useful and attractive a gift and has worked so valiantly for the cause both of history and of science, and especially of science as coming into and modifying history. His answer, no doubt, to the last criticism would be that this was an introductory volume, and that therefore he avoided such matters as philosophy. But can one properly treat of religion without philosophy? And there are sympathetic chapters about Christ and Buddha. It would help his general cause, which is the salvation of mankind by education and unity, to lay more stress on the spiritual or intellectually constructive aspect of science and less on its mechanical applications. It is not the difficulties of posts and tariffs which will ultimately bring mankind together in harmonious progress: it will be a spiritual union of which knowledge and sympathy, science and law are co-operating factors, and may be traced growing, sometimes fitfully, and at various times and places, but never quite extinguished from the beginning of history till now. These should be the leading threads in any short sketch of human history as a whole, and it is because of their decisive contributions to those elements that Greece, Rome, Christianity, and modern times deserve a special place.

F. S. MARVIN.

Naturalisation of Animals and Plants.

The Naturalisation of Animals and Plants in New Zealand. By the Hon. George M. Thomson. Pp. x + 607. (Cambridge: At the University Press, 1922.) 42*s.* net.

FROM those early days in the neolithic age when the nomad tribesman drove his domestic stock from the region of its creation to new areas, naturalisation of plants and animals has been a fact to be reckoned with in the evolution of faunas and of humanity. Even in countries where the introduced creatures belonged to groups identical with, or closely related to, members of the indigenous fauna, and where, on that account, a simple speeding-up of a process already in force might have been expected, the influence of naturalisation on fauna and flora has been profound. It is easy to imagine how much more intense that influence might be in countries where the new-comers belonged to orders of animal and plant life unrepresented in the native fauna and flora, and entered a free field unhampered by the checks which, in the course of ages, had created in the old country a tolerably stable balance of Nature. It is this unusual mingling of the faunas of distinct and widely different zoo-geographical regions that gives special significance to the events in Australia and New Zealand, and has made the attempts of the settlers there a by-word in the history of acclimatisation.

Another special interest attaches to these areas, however, and adds enormously to the value of this book. In the old countries, lying in the way of the migrations of palæolithic and neolithic man and his successors, introductions of plants and animals have taken place from time immemorial, with the result that, since the beginnings are lost to view, results can be only dimly envisaged; but in New Zealand, apart from a few prehistoric Polynesian introductions, almost every beginning has a date, and almost every stage of progress can be measured in terms of years.

Mr. Thomson has dealt with the unique opportunity that lay to his hand in the scientific spirit; he has been chary of broad generalisations, and he has been at endless pains to collect and verify information, much of which in a few years would otherwise have slipped from ken. Consequently his work must be regarded as a standard contribution to the history of acclimatisation.

The plan of the book is of the simplest: after a short introduction and historical review, it proceeds to consider each animal and plant introduced to New Zealand, whether or not it has become established, in its order in systematic classification. (The author has overlooked the fact that all his rodents are grouped under the heading "Carnivora.") The mass of material handled can be only roughly gauged by the fact that of mammals and birds alone, 48 of the former have been introduced, of which 25 have become truly feral, and of the latter, 24 out of 150 introduced species are now thoroughly established; while of plants, more than *six hundred species* have become "more or less truly wild."

It is impossible here to follow Mr. Thomson's catalogue of events; even the familiar stories of the ill-starred introductions of the rabbit and its enemies, and of the introduction of humble-bees to fertilise the introduced red clover, are filled with new and significant detail; but let us turn to some of the broad results of this century and a half's intense interference with Nature.

Great expectations were formed of the probability of seeing the development of new variations and of incipient new species; but fifty years of close observation lead the author to state that he is "aware of no definite permanent change in any introduced species" (p. 513). The statement does not exhaust the possibilities, however; first, because the time is short—the first animals were introduced in 1773, and most have been in the country for scarcely more than half a century; secondly, because changes are noticeable—red deer introduced from Forfarshire only fifty years ago, now carry, instead of a former limit of 12, up to 20 points on their antlers; and, thirdly, because the progeny of introduced animals has not been submitted to that minute examination and comparison of cranial and other characters on which racial distinctions are now based. Again, Darwin and Wallace both expected that the wholesale naturalisation of European plants would ultimately exterminate part of the native flora. The author sees no evidence of such a process: "The native vegetation can always hold its own against the introduced" (p. 528); "the struggle . . . will result in a limitation of the range of the native species rather than in their actual extermination" (p. 533). But is the conclusion not doubtful, or at any rate premature? In long-civilised countries, for example, Scotland, it has been shown that there are no bounds to the cumulative effect of man's influence, and that limitation of range is too often but a first step to ultimate, even if long-delayed, extinction.

Yet many changes have been observed. Introduced trout established new records in size, water-cress grew to a length of twelve to fourteen feet, "with stems as thick as a man's wrist," the common spear thistle formed thickets six to seven feet in height; even since 1868 nine species of birds have disappeared to a great extent or altogether, and many have been driven to the wildernesses; several species of fish have been exterminated by established introductions; habits have changed—many species have adopted introduced food plants, the Kea parrot supplements its fruit diet with the flesh of living sheep. On the whole, the introductions have done much more harm than good. Of all the birds introduced, the only one against which no complaint has ever been made is the hedge sparrow; but there must often be difficulty in assessing the balance of good and evil. In one place we are told that "the evidence regarding the destruction of the native avifauna by stoats and weasels is very inconclusive" (p. 73), and in another that "these animals [weasels and other vermin] are largely responsible for the decrease in the numbers of native birds" (p. 89).

One conclusion, however, is manifest, that neither in New Zealand nor elsewhere should naturalisation of exotic animals be permitted, except with the consent of a properly constituted advisory committee containing a strong representation of biological science. Perhaps we can afford to smile at the enthusiasm of men who endeavoured to establish migratory birds, or brought from Britain the humble-bee, *Bombus terrestris* (now the commonest species in New Zealand), to fertilise the red clover, not knowing that its trunk was too short to reach the bottom of the clover flower; but we should not be subject to the vagaries of such as the New Zealand legislator who, when it was proposed to introduce half a dozen Venetian gondolas, to be placed on a lake in the public gardens of Nelson, protested against the extravagance and desired to import only a pair, "and then let Nature take its course."

JAMES RITCHIE.

Boscovich and Modern Science.

A Theory of Natural Philosophy. Put forward and explained by Roger Joseph Boscovich. Latin-English edition. From the Text of the First Venetian edition published under the personal superintendence of the Author in 1763. With a short Life of Boscovich. Pp. xix+470. (Chicago and London: Open Court Publishing Co., 1922.) 63*s*. net.

IN the time of Boscovich the line of demarcation between the philosopher and the physicist or mathematician was much less clearly marked than it is to-day—perhaps it is better to say than it was a few years ago. It is therefore to be expected of a man of Boscovich's energy and versatility, living in the eighteenth century, that he should have explored the borderland of philosophy and science. The book before us contains the contribution of Boscovich to this domain—for us the most important work of his life. In it he appears to a modern as a philosopher rather than a man of science, interested largely in the search for and use of *a priori* arguments, but in close touch with the scientific theories and explanations of his day.

Whether this classification is right or wrong, the book is full of interest. Boscovich is sometimes claimed as the father of modern atomic theory, and this volume provides at any rate partial justification for the claim. For Boscovich shows with admirable clearness how many diverse phenomena in mechanics and even in other branches of physics can be explained in a natural qualitative way on his hypothesis that matter consists of discrete points accelerated towards each other by a perfect definite law of suitable form. But from the modern point of view his work in this connexion is scarcely more interesting than the earlier work of Daniel Bernoulli, or the still earlier ideas of Hooke. To a mathematician perhaps the most interesting sections of the book are those in which Boscovich expounds the law of continuity, the doctrine of impenetrability, and their consequences. It is at once evident that his ideas of the properties of a continuum and of a progression, though of course not extensive, are invariably clear and accurate.

Other interesting passages are those in which Boscovich makes use of proofs by induction or criticises the inductive reasoning of others—for example, attempts to establish thus that matter must have continuous extension. He is always careful to explain why he believes his own inductive arguments to be valid when he makes them. In fact one may strongly suspect that his first instinct in all such cases is to take up a sound sceptical point of view, with perhaps a slight weakness for his own favourites. In this he is by no means unique, and in full agreement with a certain distinguished man of science of to-day who is reported to have defined scientific truth in conversation with a friend as "the theories which you and I believe, and I include you for courtesy."

Boscovich is firmly convinced of the underlying simplicity of all natural phenomena. The main thesis of his book is to show that it is conceivable that all the properties of matter might be explainable on the basis of his unique acceleration law. In a delightful passage (pp. 105-7) he attacks the multiplicity of forces used by the physicists of his day and the danger of concluding that Nature is complicated when it may only be that the mathematics is inadequate.

Both as a final example of the depth and range of his ideas and for its latter-day interest we must quote the following passage, in which he is discussing the form of his acceleration law. He has just assumed that the mutual acceleration of two of his points is always bounded except when the distance between them actually tends to zero. He proceeds: "In this case it is evident that, if a sufficiently great velocity can be given to any mass, it would pass through any other mass without any perturbation of its own parts, or of the parts of the other. For the forces have no continuous time in which to act and produce any finite sensible motion; since if this time is diminished immensely . . . the effect of the forces is also diminished immensely. We can illustrate the idea by the example of an iron ball, which is required to pass